Department of Energy
Office of Worker Protection Programs and Hazards Management
Radiological Control Technical Position
RCTP 99 - 04

Acceptable Approach for Controlling and Calibrating Radiation Detection Instruments

Issue:

Section 835.401(b)(1) of Title 10, Code of Federal Regulations, Part 835, *Occupational Radiation Protection* (10 CFR 835) requires that instruments and equipment used for (radiation) monitoring be periodically maintained and calibrated on an established frequency. Some DOE contractors have questioned whether DOE intends for radiation detection instruments to be subject to DOE requirements and industry consensus standard guidance for measuring and test equipment (M&TE).

Introduction:

10 CFR 835.401(b) establishes general requirements for radiation detection instrument selection, calibration, and maintenance. DOE has provided appropriate guidance for achieving compliance with these requirements in DOE G 441.1-7, *Portable Monitoring Instrument Calibration* (DOE, 1999a). This Guide indicates, in part, that ANSI N323, *American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments* (ANSI, 1997), provides appropriate guidance for establishing and operating an instrument calibration program that will comply with the requirements of 10 CFR 835.

10 CFR 835 does not establish specific requirements for M&TE; these requirements are established in Section 12 of DOE Order 4330.4B, *Maintenance Management Program* (DOE, 1994). Although DOE Order 4330.4B has been superseded, it is and will remain the controlling directive for many DOE facilities, including defense nuclear facilities, until 10 CFR 830.320, *Maintenance Management*, is finalized. The primary industry consensus guidance document applicable to M&TE is ANSI/NCSL Z540.1-1994, *Calibration Laboratories and Measuring and Test Equipment* (ANSI, 1994). There is some concern that, should radiation detection instruments be considered M&TE, then the calibration and maintenance programs for these instruments would be subject to duplicative and, in some cases, conflicting provisions established in the two ANSI standards.

Requirements:

Applicable Requirements (based on the November 4, 1998 amendment to 10 CFR 835)

835.2(a) Definitions

Calibration means to adjust and/or determine either:

(i) The response or reading of an instrument relative to a standard (e.g., primary, secondary, or tertiary) or to a series of conventionally true values; or

(ii) The strength of a radiation source relative to a standard (e.g., primary, secondary, or tertiary) or conventionally true value.

Subpart E--Monitoring of Individuals and Areas

§ 835.401 General requirements.

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(b) Instruments and equipment used for monitoring shall be:
(1) Periodically maintained and calibrated on an established frequency;
(2) Appropriate for the type(s), levels, and energies of the radiation(s) encountered;
(3) Appropriate for existing environmental conditions; and
(4) Routinely tested for operability.

Discussion:

Questions regarding the classification of radiation monitoring instruments as M&TE arise from the language in DOE Order 4330.4B, which is somewhat vague in its description of M&TE. DOE's has evaluated this language and the history of the Order to determine its intent and scope.

DOE Order 4330.4B indicates that "M&TE includes all tools, gauges, instruments, devices, or systems used to inspect, test, calibrate, measure, or troubleshoot in order to control or acquire data for verifying the conformance of an instrument or piece of equipment to specified requirements." This description is necessarily broad; however, the Order repeatedly refers to operations involving M&TE as related to calibration of installed and operational instruments and equipment. DOE believes that this usage is consistent with common usage of the term M&TE in the industry - that is, M&TE is used as a calibration standard for other instruments that are in turn used to perform operational measurements. For example, a pressure gauge that is classified and controlled as M&TE may be used as a standard for performing calibrations of other pressure gauges that are installed in facility fluid systems. Although there may be instances in which M&TE is used to perform operational measurements, this is not the most common usage.

Operations similar to that discussed above exist within the radiation protection discipline. For example, an air flow meter that is classified and controlled as M&TE may be used as a calibration standard for an air flow gauge installed in an air sampling device. Likewise, certain radiation detectors that are classified and controlled as M&TE may be used as calibration standards for radiation detectors that are used to make field measurements (including both portable and permanently-installed detectors). In each of these cases, the calibration standard is classified and controlled as M&TE; the operational device is not considered to be M&TE and is calibrated and maintained in accordance with 10 CFR 835 and its applicable guidance.

Technical Position:

DOE does not consider radiation detection instruments that are commonly used to perform area and individual monitoring required by 10 CFR 835 to be measuring and test equipment as discussed in DOE Order 4330.4B. DOE G 44.1.-7 indicates that ANSI N323 provides appropriate guidance for establishing and operating a calibration program for portable radiation monitoring instruments. While ANSI/NCSL Z540.1 provides guidance that may be useful in such programs, this guidance need not be applied to calibration of radiation detection instruments used in operational settings.

Radiation detection instruments that are used as calibration standards should be considered M&TE and used, handled, stored, and calibrated in accordance with the applicable standards.

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References:

1. 10 CFR 835, *Occupational Radiation Protection*, U.S. Department of Energy, November 4, 1998.

2. DOE G 441.1-7, *Portable Monitoring Instrument Calibration*. U.S. Department of Energy. May 1999.

3. DOE Order 4330.4B, *Maintenance Management Program.* U.S. Department of Energy. February 1994.

4. DOE O 414.1, *Quality Assurance*. U. S. Department of Energy. November 1998.

5. ANSI N323, *American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments*. American National Standards Institute. 1997.

6. ANSI/NCSL Z540.1-1994, *Calibration Laboratories and Measuring and Test Equipment*. American National Standards Institute. 1994.